

Claims

1. An apparatus for sealing a puncture tract disposed within tissue, the apparatus comprising:

a housing; and

a plurality of needles coupled to the housing, the plurality of needles configured to penetrate tissue surrounding the puncture tract to deliver a closure agent into the tissue, thereby sealing the puncture tract.

2. The apparatus of claim 1, further comprising an expandable member configured to be disposed within the puncture tract to stabilize the tissue during insertion of the plurality of needles.

3. The apparatus of claim 2, wherein the expandable member is disposed from a distal end of a shaft coupled to the housing.

4. The apparatus of claim 1, 2 or 3, further comprising a stop configured to limit translation of the plurality of needles into the tissue.

5. The apparatus of claim 1, 2, 3 or 4, further comprising an actuator coupled to the plurality of needles for selective translation of the plurality of needles.

6. The apparatus of claim 1, 2, 3, 4 or 5, wherein the closure agent comprises a biodegradable substance.

7. The apparatus of claim 6, wherein the biodegradable substance is chosen from the group consisting of a water swellable gel, collagen, a saline

- 24 -

bolus, a slurry of a biocompatible substance, and combinations thereof.

8. The apparatus of any one of claims 1 to 7, wherein the closure agent comprises an inflammatory substance that causes a localized inflammation response.

9. The apparatus of claim 8, wherein the inflammatory substance comprises copper sulfate.

10. The apparatus of any one of claim 1 to 9, wherein the closure agent comprises at least one balloon coupled to the plurality of needles.

11. The apparatus of any one of claims 1 to 10, wherein the closure agent is coated onto the plurality of needles.

12. The apparatus of any one of claims 1 to 11, wherein each one of the plurality of needles comprises a distal tip configured to penetrate the tissue, a distal aperture, and a lumen that couples the distal aperture to a source of closure agent.

13. The apparatus of claim 10, 11 or 12, further comprising a radiopaque marker disposed adjacent to the distal tip of each one of the plurality of needles.

14. The apparatus of any one of claims 3 to 13, further comprising a radiopaque band disposed on the distal end of the shaft.

15. The apparatus of any one of claims 1 to 14, wherein the housing further comprises a manifold

- 25 -

having an inlet port, the manifold in fluid communication with the plurality of needles.

16. The apparatus of claim 15, wherein the plurality of needles are configured to translate with the manifold.

17. The apparatus of any one of claims 3 to 16, wherein the expandable member has a deployed configuration configured for engagement with an interior surface of a vessel.

18. The apparatus of any one of claims 1 to 17, wherein the plurality of needles are coupled to the housing in a predetermined array.

19. The apparatus of claim 18, wherein the predetermined array comprises an annular configuration.

20. The apparatus of any one of claims 1 to 19, wherein the puncture tract has a first length and the plurality of needles has a second length extending distal of the housing, and wherein the second length is less than the first length.

21. The apparatus of any one of claims 1 to 20, further comprising a centering shaft adapted for placement in the puncture tract.

22. The apparatus of claim 21, wherein the plurality of needles and the housing are rigidly coupled to the centering shaft.

23. The apparatus of claim 21 or 22, wherein the plurality of needles and the housing are configured for advancement over the centering shaft.